

**MICHIGAN SURVEILLANCE AND RESPONSE PLAN
FOR HIGHLY PATHOGENIC AVIAN INFLUENZA IN FREE-RANGING
WILDLIFE**

**Michigan Department of Natural Resources
Wildlife Division**

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Michigan Surveillance and Response Plan for Highly Pathogenic Avian Influenza in Free-ranging Wildlife

Michigan Department of Natural Resources, Wildlife Division

Avian influenza (AI) is a disease caused by a virus found in wild birds, especially waterfowl and shorebirds. The virus is found only in small numbers of birds in the wild, and infection typically causes few, if any, symptoms. The virus is shed in fecal droppings, saliva and nasal discharges. Since 2003, a strain of AI virus capable of causing particularly severe disease has emerged in Asia, the Highly Pathogenic AI (HPAI) H5N1 virus. HPAI H5N1 probably originated from domestic poultry in Asia. It is of critical concern because: 1) it poses a threat to domestic poultry, especially chickens; 2) it has caused illness in approximately 150 persons, including the deaths of at least 74 people as of January 6, 2006; and 3) the emergence of HPAI H5N1 in humans poses a potential global pandemic (i.e., worldwide epidemic) influenza threat. Most human HPAI H5N1 cases are thought to have acquired HPAI H5N1 virus infection through direct handling of infected poultry, consumption of uncooked poultry products or contact with virus-contaminated surfaces/materials. Limited person-to-person transmission of HPAI H5N1 has also been documented. Avian influenza viruses other than HPAI H5N1 have been found in many bird species, but are most often found in migratory waterfowl. However, the only documented mortality event in wild birds, prior to the current MPAI H5N1 outbreak, killed common terns in South Africa in 1961.

This document proposes a broad outline of activities to be undertaken by the Michigan Department of Natural Resources (DNR), Wildlife Division, to:

- Determine whether or not HPAI H5N1 virus currently exists in wild birds in Michigan, and its geographic extent, if present;
- Provide a framework for ongoing surveillance to detect introduction of HPAI H5N1 virus into wild birds in the future;
- Act promptly if HPAI H5N1 is present in wild birds, to limit propagation of the virus among wild birds, and transmission of the disease to domestic poultry and humans.

The DNR activities can be broadly divided into two categories: Surveillance and Response. Early detection and the rapid, accurate diagnosis of disease set the stage for response activities to follow. These are accomplished by surveillance of wild populations to detect sick or dead birds through diagnostic testing. Once surveillance has provided a basic understanding of the distribution of the disease and its magnitude, specific response activities can be formulated. These are used to control the spread of disease, prevent exposure of susceptible but as yet unexposed hosts, and, where possible and desirable, eradicate the disease.

Communications and education activities will change tone and direction depending on circumstance, but are active, ongoing functions related to both surveillance and response modes. Continual communication and education activities, directed at lawmakers, key constituency groups, the media and the general public will raise public awareness of HPAI, increase understanding of the disease, and help ensure broad-based public support for DNR HPAI activities.

I. Introduction¹

- A. *The agent:* Avian influenza is usually an inapparent or subclinical viral infection of wild birds. It is caused by a group of viruses known as type A influenza. In nature, these viruses change rapidly by continuously mixing their genetic components (mutating) to form slightly different virus subtypes. Collectively, avian influenza infections are caused by these slightly different viruses rather than by any single virus type. The virus subtypes are identified and classified on the basis of two broad types of antigens, hemagglutinin (denoted as H) and neuraminidase (N); 16 H and 9 N antigens have been identified among all of the known type A influenzas. Thus, there are 144 (16 × 9) different virus subtypes of AI currently known.
- B. *Species susceptibility:* Avian influenza viruses have been found in many bird species, but are most often found in migratory waterfowl (ducks, geese, and swans). Other wild birds known to be capable of harboring influenza viruses include shorebirds, gulls, quail, pheasants, and ratites (e.g., ostrich and rhea). Experimental infections of domestic birds (e.g., chickens, ducks, etc.) with virus subtypes isolated from free-ranging wildlife do not cause mortality. Similarly, virus subtypes that cause disease in domestic fowl do not normally cause mortality in wild waterfowl. However, recent mortality in wild birds due to HPAI H5N1 has been reported in China, Turkey and Mongolia. Avian influenza viruses can also infect certain mammals such as pigs, horses, dogs and humans.
- C. *Transmission:* Various AI virus subtypes circulate among wild birds worldwide. Certain birds, particularly water birds, act as hosts for influenza viruses by carrying the virus in their intestines. Infected birds shed virus in saliva, nasal secretions, and feces. Susceptible birds can become infected with AI virus when they have contact with nasal, respiratory, or fecal material from infected birds. Fecal-to-oral transmission is the most common mode of spread between birds. Most often, wild birds that host the virus do not get sick themselves but can spread AI to other birds (termed inapparent or subclinical infection).
- Infection with certain AI viruses (e.g., some H5 and H7 strains) can cause widespread disease and death among some species of domesticated birds. Domestic poultry may become infected with some AI subtypes through direct contact with infected free-ranging waterfowl or other infected poultry, or through contact with surfaces (such as soil or cages) or materials (such as water or feed) that have been contaminated with the virus. People, vehicles, and other inanimate objects can spread influenza virus from one farm to another. Avian influenza outbreaks among poultry occur sporadically worldwide.
- D. *Epidemiology:* Susceptibility to AI infection appears relatively uniform between sexes. However, juvenile waterfowl have a higher AI isolation rate than adult birds. The highest occurrence of infection is in the late summer months in juvenile waterfowl when they assemble for their first southward migration. The number of infected waterfowl decreases in the fall as birds migrate toward their southern wintering grounds, and is lowest in spring, when only about one bird in 400 is infected during the return migration north. In contrast, the number of shorebirds and gulls infected is highest during May and June. Infection in shorebirds is also high in September and October.
- E. *Symptoms and gross lesions:* Avian Influenza viruses causing severe disease in wild birds are rarely found, and observable signs of illness have not been described. Only once before the current HPAI H5N1 outbreak in Asia has mortality in wild birds due to AI

¹ Some of the following material is drawn from a Report to the Homeland Security Council Policy and Coordination Committee entitled *Highly Pathogenic Avian Influenza Early Detection*, Interagency Working Group, December 28, 2005; United States Geological Survey Wildlife Health Bulletin 05-03; Alaska Department of Fish and Game, *What Hunters Should Know About Avian Influenza*; *Field Manual of Wildlife Diseases*, USGS Information and Technology Report 1999-2001; and USDA-US Policy to Ensure the Protection of Personnel Involved in Highly Pathogenic Avian Influenza Control and Eradication Activities.

been noted. Common terns that died of AI in South Africa in 1961 did not have gross lesions, but a few birds had microscopic evidence of inflammation of the membrane that covers the brain (meningoencephalitis).

Signs of disease in domestic poultry may appear as respiratory, digestive, or reproductive abnormalities. Included are such nonspecific manifestations as decreased activity, food consumption, and egg production; ruffled feathers; coughing and sneezing; diarrhea; and nervous disorders, such as tremors.

- F. *Diagnosis:* Infected birds are detected by isolating virus from cloacal swabs, and growing it in embryonated chicken eggs, as well as by serological testing of blood for antibody. The latter test indicates whether a bird was exposed to these viruses at some point in its life, but not whether it is currently infected or carries the disease. Reference antisera to all of the subtype antigen combinations are used to determine the specific subtype of virus. However, the ability of a specific virus subtype to cause severe disease, termed virulence, cannot initially be determined by antigenic subtype alone. Laboratory and animal inoculation tests are required. Measurement of virulence is based on an index established for domestic poultry. Both virulent and non-virulent strains of the same virus subtype can circulate in nature, so isolation of a particular virus subtype does not necessarily portend the severity of disease that subtype is likely to cause.
- G. *Control:* The role of wild birds in the spread of HPAI H5N1 remains unresolved. There is currently no evidence that HPAI H5N1 infection in humans has been acquired from wild birds. Circumstantial evidence suggests limited local infections of resident wild birds, but spread of HPAI H5N1 outside initial outbreak zones by migratory birds has not been substantiated. Complete eradication of HPAI H5N1 from Asia is probably precluded by its presence in wild bird populations, because control of infections in wild birds is not feasible. Culls of wild birds are highly unlikely to stop disease spread and are extremely difficult, if not impossible, to implement effectively. On the contrary, culls have the potential to make outbreaks worse by dispersing infected individuals and stressing healthy birds, making them more susceptible to disease. Moreover, despite their remote likelihood of success, culls divert limited resources away from more effective disease control and management efforts.

II. **Surveillance Plan**

The DNR will conduct three types of surveillance (i.e. testing to determine the presence/absence and extent of disease) in free-ranging wild birds:

- Examination of carcasses from mortality events (i.e., die-offs) affecting wild birds
- Sampling of live-caught wild birds
- Sampling of hunter-harvested wild birds

The primary strength of investigations of mortality events is based upon the observation that HPAI H5N1 differentially kills particular species of wild birds. As such, a wild bird die-off serves as a "trigger event" that immediately focuses investigation on a particular area and species. Further, because the current form of HPAI H5N1 circulating in Asia will be new to North America, HPAI H5N1 will likely be detected if it is the cause of a die-off in the presumably susceptible North American wild bird population. Therefore, recovery of carcasses and samples from wild bird die-offs affords an efficient and timely means of detecting HPAI H5N1.

Live bird surveillance provides the opportunity to detect inapparent infections, and so offers the potential for early detection of arrival and spread of HPAI H5N1. Because of Michigan's size and the number of resident and transitory species, careful scientific

consideration will be needed to identify appropriate species and locations for live bird sampling.

Hunter-harvested birds will provide an opportunity to augment live bird surveillance by providing large numbers of birds for sampling with reduced effort. However, because a limited number of species are targeted for hunting, the choice of species and locations for sampling should be based on likelihood of exposure and susceptibility, not solely on ease of collection.

Because the primary goal of this Plan is the earliest possible detection of HPAI H5N1 in free-ranging wild birds, all of the strategies described are important. However, not all strategies are practical to conduct in all areas of Michigan. To be effective, all will require considerably greater monetary and personnel resources than are currently available. The greatly increased number of sample submissions will require diagnostic laboratories to be prepared in advance. Surveillance of live birds would be most effective when used to determine the pattern of geographic spread subsequent to a HPAI H5N1-caused die-off. While wild bird die-offs are important to investigate for a variety of reasons, HPAI H5N1 will not be the cause of most of the mortality events investigated. Other diseases that are transmissible to humans and/or important to wildlife conservation or agriculture may also be detected.

A. Investigation of morbidity and mortality events in free-ranging wild birds

Overview: The systematic investigation of morbidity and mortality events in wild birds offers the highest probability of detecting HPAI H5N1 efficiently if it is introduced into the United States (US) by migratory birds. There is increasing evidence that HPAI H5N1 is capable of killing wild birds in substantial numbers, which is not typical of other AI virus subtypes. As such, the movement of the virus through Asia and into Europe thus far has been documented in part through the investigation of mortality events in wild migratory birds.

The initial detection of a mortality event is critically dependent upon the public and well-trained and observant field personnel. These people in turn must communicate with an experienced staff of disease investigation specialists that obtain the maximum amount of information from the event. Depending upon the significance, scope and severity of the mortality event, these highly-trained individuals may conduct field investigations to obtain information first hand. In addition to establishing a diagnosis, disease investigation specialists provide useful wildlife management recommendations to potentially limit further morbidity and mortality.

In the event HPAI H5N1 is detected in free-ranging wild birds, it will be important to investigate the proximity of domestic poultry and swine operations to initiate activities to minimize their contact with wild birds. Morbidity and mortality of wild birds are most likely to occur where migratory birds mingle, particularly in wetlands. Early outbreaks of HPAI H5N1 would most likely occur in Alaska and along the Pacific Flyway of the United States and Canada, where migratory birds from Asia congregate in the summer and early fall prior to migration within North America (Figure 1). However, given that migrants also move from Alaska to other parts of North America (albeit less frequently), surveillance strategies should include other flyways as well (Figure 2).

Methodology: The success of this surveillance strategy is contingent upon: 1) early detection of morbidity and mortality; 2) rapid reporting and submission of appropriate biological specimens to qualified diagnostic facilities; 3) immediate epidemiological assessment of the field event; 4) rapid, accurate, and consistent diagnosis and confirmation; 5) immediate reporting of diagnostic results once confirmed; and 6) pre-planned contingency and response training.

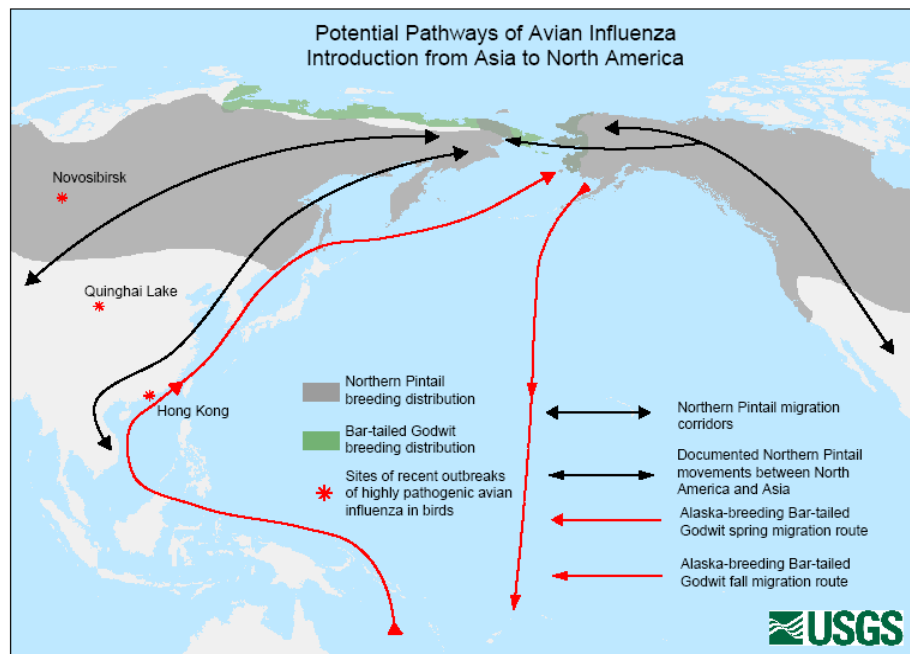


Figure 1. Potential Disease Transmission Across Continents. From the document: *Highly Pathogenic Avian Influenza Early Detection*; Interagency Working Group Report to Homeland Security Council Policy and Coordination Committee, August 18, 2005

Specific steps that will be necessary to facilitate early detection of HPAI H5N1 include:

1. DNR personnel will be instructed to increase vigilance and to establish routine and systematic monitoring of wild bird populations for morbidity and mortality events.
2. A uniform protocol for reporting mortality events will be developed with instructions for the safe handling and shipment of specimens to the DNR Wildlife Disease Laboratory (WDL). Field and response personnel will be trained in their proper use. A centralized database of investigation and testing data will be maintained and summarized in a form suitable for public dissemination.
3. Personnel will respond to mortality events with field investigations to determine onset, course, duration, distribution, affected species, and other epidemiological and environmental conditions associated with mortality events.
4. Representative carcasses and other biological samples will be submitted to the DNR WDL located in the Diagnostic Center for Population and Animal Health (DCPAH) on the Michigan State University campus for immediate necropsy and laboratory analyses. Guidelines will be developed to ensure that the appropriate number and types of samples are collected. Necropsies, histology, and laboratory investigations (virus isolation, hemagglutination inhibition tests, and molecular testing) will be performed to detect HPAI H5N1 at DCPAH, with confirmation testing done at the United States Department of Agriculture (USDA), National Veterinary Services Laboratory (NVSL).
5. HPAI H5N1 is a US Centers for Disease Control (CDC)/USDA Select Agent, thus the CDC/USDA Select Agent Program will be notified immediately upon confirmation of HPAI H5N1, and all Select Agent guidelines will be followed as required. Because

HPAI H5N1 is also a reportable disease, the State Veterinarian, the USDA Area Veterinarian in Charge (AVIC), and Office International Des Epizooties (OIE) will be informed simultaneously of the discovery. Public release of information will occur only after the confirmed final results are thus reported.

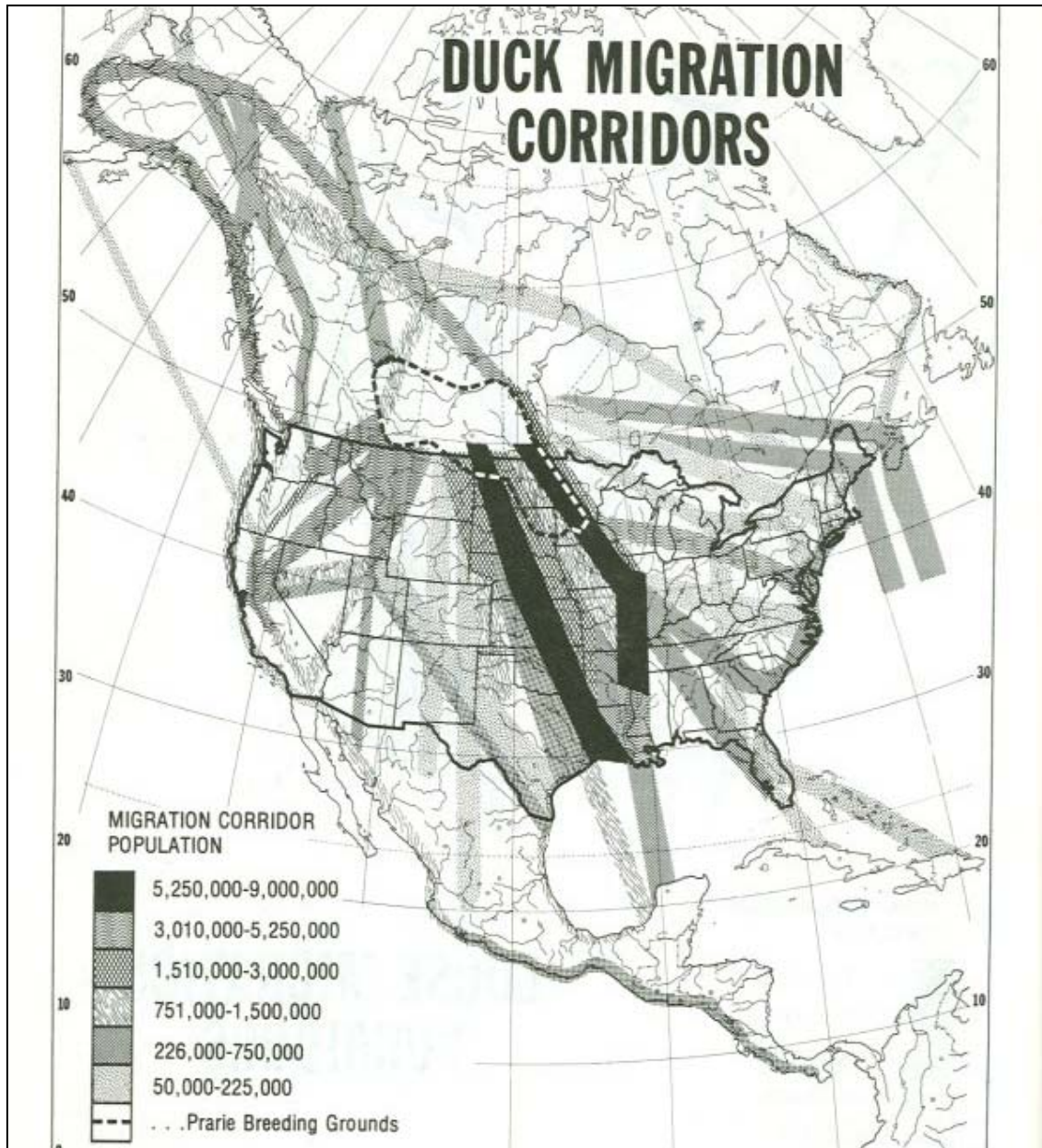


Figure 2. North American duck Migration Corridors. From: *Ducks, Geese & Swans of North America*, Frank C. Bellrose, 1980, Stackpole Books.

B. Targeted surveillance for HPAI H5N1 in live free-ranging wild birds

Overview: This strategy incorporates sampling of live-captured, apparently healthy migratory birds to detect the presence of HPAI H5N1 or antibodies to HPAI H5N1. Virus isolation from cloacal or fecal samples is a common and widely used method for

detecting AI. Serologic testing for specific antibodies is particularly useful because it may detect previous exposure to HPAI H5N1 in cases where a fecal sample is negative by virus isolation. The combination of virus isolation and serology offers a high degree of sensitivity for AI virus detection. This effort targets bird species in Michigan that represent the highest risk of exposure to or infection with HPAI H5N1 because of their migratory patterns. This includes birds that migrate directly between Asia and North America or birds that may be in contact with species from areas with reported outbreaks.

Alaska and adjacent areas in the Russian Far East represent a unique case where major flyway systems cross continental boundaries. Two major Asian flyways (the East Asian-Australasian and East Asian) include both Southeast Asia and the arctic regions of Siberia and Alaska. The East Asian-Australasian Flyway extends from the Asian arctic to Australia and New Zealand, covering 20 countries. Similarly, in North America, the Pacific Flyway extends from arctic Asia and North America to South America. The overlap at the northern ends of these flyways establishes a path for potential disease transmission across continents and for exchange of genetic material among AI subtypes from Eurasia and North America. Such transport is not unreasonable, as the contribution of Eurasian AI subtypes to viruses in North American wild birds has already been demonstrated. While some concern exists about the potential spread of HPAI H5N1 westward from Asia to the United States via Europe, there is less movement of wild birds between Europe and North America. If migratory birds are to introduce the virus subtype to the United States, it is far more likely to arrive in Alaska first.

Methodology: Birds will be sampled in conjunction with existing banding operations (Figure 3.) when possible, with additional bird captures as necessary to provide broad species and geographic surveillance. Efforts will focus on species that could travel directly to Alaska from Southeast Asia, those breeding in Alaska, and those that

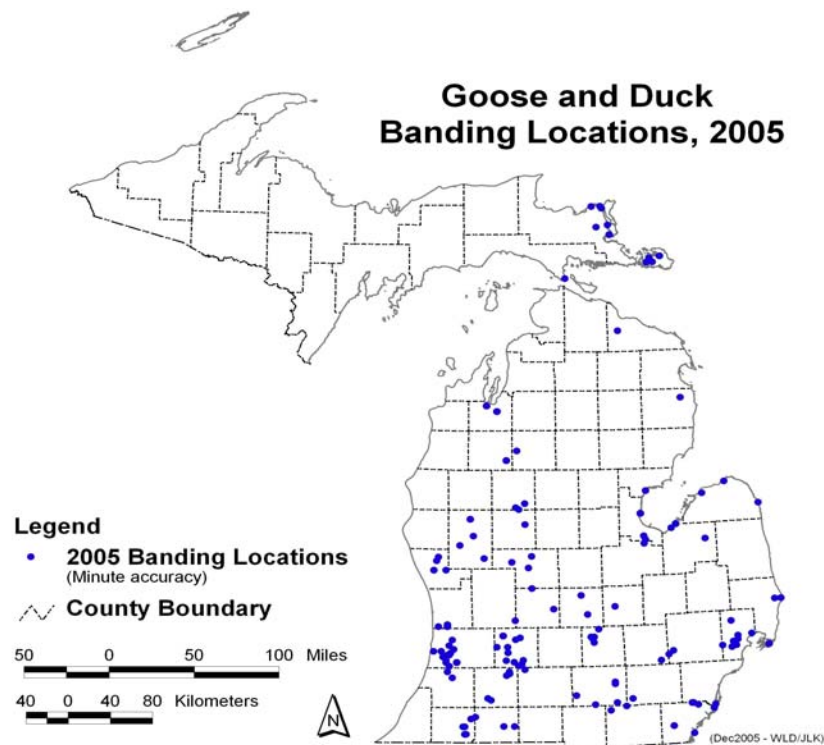


Figure 3. DNR Goose and Duck Banding Locations, 2005.

commingle in Alaska prior to migration down the Mississippi Flyway. Examples include

northern pintail, common merganser, red-breasted merganser, snow geese, American widgeon and green-winged teal, scaup, northern shoveler and mallard. Other species will be sampled if surveillance elsewhere indicates exposure to or infection with HPAI H5N1.

Fecal samples will be collected via cloacal swabs using standard methods. Swabs will be inserted into pre-labeled tubes of Viral Transport Medium and kept chilled or frozen overnight for shipment to the DCPAH. Blood samples will also be collected and tested at the DCPAH for evidence of exposure to AI viruses. All birds sampled will be banded. A target sample size of 200 individuals per species will be sought (this sample size will be difficult for many of the target species), allowing sufficient power to detect a HPAI H5N1 prevalence of $\geq 1.5\%$ with 95% confidence. However, it must be realized that the main species captured during banding operations are Canada geese, wood ducks and mallards.

Upon receipt at the DCPAH, cloacal swabs will be labeled and moved to a storage freezer at -80°C until processing. Batches of 10 to 20 swabs will be thawed, ribonucleic acid (RNA) extracted and subjected to polymerase chain reaction (PCR) assay for HPAI H5N1 virus (or AI viruses as a group) by standard methods. Alternatively, liquid from swab specimens will be filtered and inoculated onto cell cultures or embryonated chicken eggs for virus isolation, with isolates then analyzed by PCR. Bird sera will be tested for AI antibody by agar-immunodiffusion. Positive sera will be submitted to NVSL for identification of H and N viral subtypes.

C. Targeted surveillance for HPAI H5N1 in hunter-killed free-ranging wild birds

Overview: Check stations and opening-day bag checks for waterfowl hunting are operated by the DNR to collect information on harvest (Figure 4). Hunter check stations provide an efficient and cost effective means to collect additional samples for surveillance

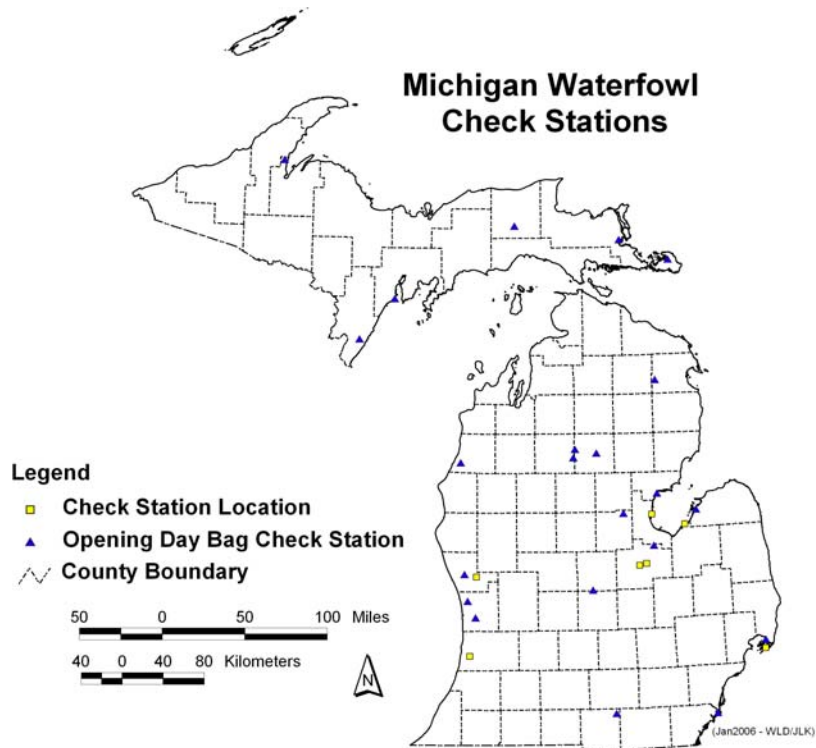


Figure 4. Michigan Waterfowl Check Stations and Opening-Day Bag Check Locations, 2005. DNR Wildlife Division.

of HPAI H5N1 (and other AI subtypes) to supplement surveillance in live-captured migratory birds, increasing the number of species, geographic locations and time periods represented.

Methodology: Like surveillance in live-captured birds, testing of hunter-killed birds will focus on hunted species most likely to be exposed to HPAI H5N1 in Asia that have relatively direct migratory pathways to Alaska ("primary" species). Additional samples collected on wintering grounds in the lower 48 states will include both primary species and species that mix with them in Alaskan staging areas (secondary species). In Michigan, the northern pintail is the likely primary species for sampling, while secondary species include American widgeon, green-winged teal, northern shoveler, mallard and lesser scaup. Currently, the probability of HPAI H5N1 transmission from primary to secondary species in the wild is poorly understood. However, AI viruses are known to remain viable for months in cold freshwater. If secondary transmission proves efficient, a very large number of species could potentially be involved. Thus, sampling efforts will target the species, populations and wintering areas where research and field experience suggest HPAI H5N1 is most likely to be detected. The complete design and implementation of this strategy requires closer coordination with other states through the Flyway Council system. Unlike other approaches, the use of hunter-harvested birds will be highly visible to the public, and consequently should be discussed in advance with hunting organizations to ensure their cooperation.

A sample size of 200 birds per species throughout the state will be sought, allowing detection of HPAI H5N1 at a prevalence of $\geq 1.5\%$ with 95% power. Cloacal swabs will be collected, processed and tested by PCR as previously noted.

D. Education/outreach/communications for surveillance activities

During surveillance, DNR officials will focus on new ways to educate Michigan residents about HPAI H5N1 and plans for surveillance and response. All communicators should understand and be able to discuss basic HPAI H5N1 pathogenesis, how it impacts wildlife, surveillance and testing procedures, and how policies can help prevent the introduction and spread of the disease. Communication and education activities should include:

1. Appropriate staff designated by the DNR, attending local meetings of constituency groups at a regional level to make informational presentations and answer questions.
2. Natural Resources Commissioners discussing the issue at public meetings and special events to raise awareness of and build support for surveillance efforts and prevention goals.
3. The DNR raising public awareness and broad-based public support through guest editorials in daily newspapers, radio and television interviews, and other public speaking opportunities.
4. State agency personnel will have already presented an overview and update on HPAI H5N1 to the Michigan Legislature. Ongoing updates will keep policy-makers informed of recent developments.
5. Preparation of an HPAI H5N1 brochure and fact sheets for public distribution and publication of HPAI H5N1 information in the *Michigan Hunting and Trapping Guide* and other publications.
6. Continual provision of up-to-date information on the DNR and Emerging Diseases web sites.

III. Response Plan

If HPAI H5N1 is diagnosed in free-ranging wild birds in Michigan, the Joint Avian Influenza Management Team will be activated, and will meet regularly to coordinate decision-making for state agencies by:

- Revising the surveillance and response plan as needed;
- Attempt to secure financial resources for response;
- Working with the Governor's Office and Legislature;
- Reviewing current science concerning HPAI H5N1;
- Keeping the public informed; and
- Monitoring and reporting the progress of response efforts.

A. **If HPAI H5N1 is diagnosed in free-ranging wild birds**

The DNR response efforts are designed to limit transmission from wild birds to domestic poultry and possibly humans. All translocation of wild birds will be stopped until surveillance suggests HPAI H5N1 virus is no longer circulating among free-ranging wild bird populations.

1. *Limit Transmission from Free-ranging Wild Birds to Humans*

There is currently no evidence that human HPAI H5N1 infections have been acquired from free-ranging wild birds. However, in the face of uncertainty, precautionary measures to limit human exposure are prudent. Theoretically, the greatest potential risk of exposure to the public is to waterfowl hunters. There is also a risk to agency personnel involved in surveillance and response activities, and this is covered in section IV. The *Michigan Hunting and Trapping Guide*, *Michigan Waterfowl Guide*, *Avian Influenza Brochure*, *DNR Frequently Asked Questions*, and the DNR and Emerging Diseases websites should all carry consistent recommendations for hunters.

Because viruses like HPAI H5N1 are shed in fluid discharges and feces, avoiding contact with these materials while plucking and cleaning birds is recommended. Most viruses can be neutralized with heat, by drying, and with disinfectants such as bleach. In addition, even apparently healthy wild birds can be infected with other potentially infectious microorganisms and parasites. Practical food hygiene recommendations to hunters include:

1. Do not handle or butcher birds that are obviously sick or are found dead.
2. Do not eat, drink, or smoke while cleaning animals.
3. Wear rubber gloves and washable clothing when cleaning game.
4. Wash hands thoroughly with soap and water or disinfectant wipes immediately after handling game, and before eating, smoking, urinating or defecating.
5. Wash tools and working surfaces with soap and water, then disinfect with a 10% solution of chlorine bleach.
6. Cook all meat thoroughly – birds should reach an internal temperature of 155-165°F as measured by a meat thermometer.

2. *Limit Transmission from Free-ranging Wild Birds to Domestic Poultry*

The DNR will increase wild bird surveillance for HPAI H5N1 within a 10-mile radius around targeted large poultry operations to determine presence of the virus in those areas. The DNR will collaborate with the Michigan Department of Agriculture (MDA) on biosecurity recommendations for poultry facilities in affected areas.

The capability of AI viruses in domestic poultry to develop into forms causing severe disease is well documented. In contrast, AI viruses are almost always of low pathogenicity in wild birds. HPAI H5N1 in Asia is suspected to have spread via three routes: 1) the domestic poultry industry, 2) trade in captive wild birds, and 3) migratory birds. The evidence for spread via the domestic poultry industry is overwhelming, and the evidence for spread in the wild bird trade is extensive. Locations of the vast majority of outbreaks of HPAI H5N1 in Asia do not match the migratory patterns of wild birds, but rather are associated with major road or rail routes, both pathways for legal and illegal trade in domestic poultry and wild birds. Transmission of HPAI H5N1 is promoted in domestic flocks by high densities and constant close contact with feces and secretions by which the viruses can be transmitted. Husbandry methods in southeast Asia where domestic poultry are allowed to mix freely with free-ranging wild birds, especially waterfowl, have facilitated transmission to migratory water birds, leading to several reported die-offs.

By contrast, the evidence for spread of HPAI H5N1 viruses via migratory birds is circumstantial at best, and the epidemiological role of free-ranging wild birds remains poorly characterized. Some evidence suggests limited local infections of wild birds resident in areas of HPAI H5N1 outbreaks among domestic poultry, but transfer of HPAI H5N1 viruses outside these outbreak zones by migratory birds has not yet been substantiated. Moreover, aggressive and widespread control of infections in wild birds is not a feasible option. Culls of wild birds are highly unlikely to stop HPAI H5N1 spread and are extremely difficult and expensive to implement. Culls have the potential to facilitate geographic spread by dispersing infected individuals and stressing healthy birds, making them more susceptible to disease. Moreover, culls would divert monetary and personnel resources away from disease control and management efforts having a much greater likelihood of success.

B. If HPAI H5N1 is found in domestic poultry

1. Surveillance will be carried out by the DNR within a 10-mile radius of the positive facilities to determine presence or absence of the HPAI H5N1 virus in free-ranging wild birds. Personnel will sample 200 ducks of an appropriate species in the surveillance area, allowing detection of a virus prevalence $\geq 1.5\%$ with 95% confidence. Cloacal swabs and blood samples will be collected and sent to the DNR's WDL as outlined above.
2. In the event that the MDA requests assistance to deal with a large number of HPAI H5N1 positive poultry facilities, the DNR has personnel and equipment to help depopulate flocks and bury carcasses on site. Field personnel will be issued personal protective equipment (PPE) appropriate for exposure to the HPAI H5N1 virus and trained in its use. The amount of DNR involvement with MDA activities will vary depending on the scope of the outbreak.

C. Education/outreach/communications for response activities

In the event HPAI H5N1 is detected in Michigan, communication will play a critical role. The handling of the situation in the first 10 days will have a lasting impact on public perception of the state's ability to adequately control the disease. The DNR will designate

a limited number of knowledgeable spokespeople, including the Public Information Officers (PIOs), and work with other state agency PIOs to provide the most up-to-date information to the media, public, and other non-governmental entities. Regardless of whether HPAI H5N1 is detected in free-ranging birds, domestic poultry or humans, the Michigan Department of Community Health (MDCH), MDA, DNR and other state agencies will all be involved in a series of key actions and communications, including:

1. Security: Notification will take place upon official NVSL confirmation of HPAI H5N1 positive test results.
2. Notification: Interagency communication will begin immediately, proceeding up the divisional chain of command to each Department Director. The Directors will inform the Governor's press, legislative, and policy offices; the Natural Resources Commission; and the Commission of Agriculture.
3. Key representatives from MDCH, MDA and DNR, the Governor's office, the Natural Resources Commission, and the Commission of Agriculture will meet expeditiously to arrange a public announcement of the discovery and implement disease response.
4. A media advisory will then be issued to announce a press conference, to be held in Lansing at one of the state buildings (Capitol, Romney, Mason, Constitution Hall).
5. Agency directors or designees will inform key constituency/stakeholder groups, including counterparts in other Great Lakes states, appropriate federal agencies, legislators, and local municipality officials where HPAI H5N1 is detected.
6. The MDCH, DNR and MDA Directors, and possibly the Governor, will conduct the press conference to confirm the presence of HPAI H5N1 in Michigan and outline the state's response plan. Media packets will provide reporters with background information, a history of surveillance efforts, and other materials as appropriate.
7. In the days following the announcement, public interest (and media attention) will be at peak levels. The agency PIOs will coordinate participation in public appearances or interviews on television and radio, as well as ensuring availabilities for print reporters and articles in stakeholder/trade publications. Continual public communication will maximize public and media understanding of the situation.
8. Within 10 business days of the press conference, each agency will reactivate communication teams employed during surveillance to continue working as needed with local constituencies, facilitating communications, answering questions, and providing updates on progress.
9. Each agency's Communications Office will collect and analyze news stories to help determine the effectiveness of communication and outreach efforts, and modify them as necessary.
10. Comprehensive information on the state's HPAI H5N1 activities will be maintained on the Emerging Diseases website, <http://www.michigan.gov/emergingdiseases>.

Agency officials must execute a coordinated effort to address the situation, and maintain continual public communications to explain and update actions and goals.

IV. Occupational Safety for personnel involved in HPAI surveillance of free-ranging wild birds, or depopulation and disposal of domestic poultry

Personnel involved in HPAI H5N1 surveillance of free-ranging wild birds, or in control activities on known or potentially affected premises, are at increased risk for exposure to HPAI H5N1 virus because of potentially prolonged and direct contact with infected birds and/or contaminated materials. To mitigate the risk of exposure or infection, all DNR personnel will follow appropriate occupational safety procedures which are based on the degree of risk known to be associated with various levels and types of exposure. These procedures are based on what is currently deemed optimal to protect against both illness and viral re-assortment (i.e., mixing of genes from human and HPAI viruses).

Personal Protective Equipment (PPE): In areas where HPAI H5N1 has not been detected, field personnel will follow recommendations of the National Wildlife Health Center's *Guidelines for Handling Birds* (http://www.nwhc.usgs.gov/research/WHB/WHB_05_03.html). Personal protective equipment will include boots, coveralls, gloves, eye protection and N95 respirators. In areas where HPAI H5N1 has been detected, especially during a mass mortality event, field personnel will follow the latest CDC guidelines (<http://www.cdc.gov/flu/avian/professional/protect-guid.htm>). PPE will include complete coveralls, gloves, boots or boot covers that are either disposable or easily disinfected, eye protection, N95 respirators, as well as a mandatory health monitoring plan.

Occupational Conduct Guidance: Transmission of HPAI H5N1 virus to humans and subsequent infection, though a rare occurrence, is presumed to be due to exposure to infected birds, feces, respiratory secretions, and/or contaminated materials. Although there is evidence of limited person-to-person transmission of HPAI H5N1 infection, sustained and efficient transmission has not yet been documented.

The following summarizes recommendations developed by the CDC, the World Health Organization (WHO), and the US Occupational Safety and Health Administration (OSHA).

1. All personnel should wash their hands with soap and water frequently and immediately after gloves are removed.
3. Environmental clean up should be carried out in areas of culling, with appropriate PPE and hygiene.
4. Unvaccinated personnel should immediately receive the current season's influenza virus vaccine (to reduce the possibility of dual infection with AI and human influenza), as well as a specific human HPAI H5N1 vaccine, if available.
5. Workers should receive an approved prophylactic influenza antiviral drug daily for the duration of exposure and continuing 5-7 days thereafter. The choice of drug should be based on sensitivity testing when possible. In the absence of sensitivity testing, a neuraminidase inhibitor (e.g. oseltamivir) is the first drug of choice, since the likelihood is smaller that the virus will be resistant to this class of antiviral drugs.
6. Close contacts (e.g., family members of workers) should also receive influenza vaccines and antiviral drugs.
7. Potentially exposed workers should be monitored for development of fever, respiratory symptoms, and eye infections for 1 week after last exposure to HPAI H5N1 virus-infected or exposed birds or potentially contaminated materials. Individuals who become ill should seek prompt medical care and give notification prior to arrival at the health care provider that they may have been exposed to HPAI

H5N1 virus. Patients or health care providers that wish to report possible human cases of HPAI H5N1 should consult with the MDCH.

8. To prevent HPAI H5N1 virus from being spread to other areas, disposable PPE should be discarded properly, and non-disposable items cleaned and disinfected according to outbreak-response guidelines.
9. To minimize risk of transmission of HPAI H5N1 virus to close contacts, especially household members, ill persons should practice good respiratory and hand hygiene as outlined by the CDC (www.cdc.gov/flu/protect/covercough.htm).

Conduct Guidance for Veterinary Laboratory Workers: Highly-pathogenic AI viruses are classified as Select Agents and must be handled in USDA-approved laboratories under biosafety level (BSL) 3 enhanced or BSL-3 agriculture laboratory standards. The Diagnostic Center for Population and Animal Health is a USDA-approved BSL-3 laboratory. These standards include controlled access, double door entry with change room and shower out, use of respirators when working with specimens outside a biological safety cabinet, and decontamination of all wastes. Clinical specimens from suspect HPAI H5N1 cases may be tested by PCR using standard BSL-2 work practices in a Class II biological safety cabinet. Commercial antigen detection testing influenza viruses may be conducted under BSL-2 levels.

V. Resources required for implementation of this Plan

To increase early detection and response capabilities to the extent necessary to protect Michigan from HPAI H5N1, enhancements to current capabilities must include field personnel and systematic methods to intensively monitor for and investigate die-offs and conduct surveillance, as well as surge capacity at WDL and DCPAH. Specifically, additional funding will be required in FY 2006 and beyond to support free-ranging wild bird surveillance activities, including:

- Sample collection at waterfowl check stations and opening-day bag checks
- Logistics to mount effective live bird capture
- Travel, field supplies and equipment for sample collection
- Laboratory personnel, supplies and equipment for sample processing

The specific costs cannot be precisely determined and may vary greatly depending on the scope of wild bird surveillance and whether the DNR participates in control activities in domestic poultry. Under any scenario, even if the DNR redirects limited funds from other vital programs, *existing agency funds will not be adequate to implement this Plan*. Provision of additional state and federal funds will be necessary to protect Michigan's citizens, wildlife resources and the poultry industry from the threat of HPAI H5N1.

Michigan Department of Natural Resources



Rebecca A. Humphries, Director

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Date